



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,110	03/02/2004	Timothy Chipman	021404.0007US1	2451
34284	7590	03/05/2008	EXAMINER	
Rutan & Tucker, LLP. 611 ANTON BLVD SUITE 1400 COSTA MESA, CA 92626			INGBERG, TODD D	
ART UNIT		PAPER NUMBER		
2193				
MAIL DATE		DELIVERY MODE		
03/05/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/791,110	CHIPMAN, TIMOTHY
	Examiner Todd Ingberg	Art Unit 2193

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 07 September 2004.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-48 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-48 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 02 March 2004 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>9/04</u> .	5) <input type="checkbox"/> Notice of Informal Patent Application
	6) <input type="checkbox"/> Other: _____

DETAILED ACTION

Claims 1 – 48 have been examined.

Information Disclosure Statement

1. The Information Disclosure Statement filed September 7, 2004 has been considered.

Priority

2. Applicant's claim to priority to September 25, 2003 with Provisional applications 60/505,792 and 60/505,854 has been granted.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. Legal words like "Method" and "System" should be removed.
4. Examiner requests the Applicant complete page 1 of the Specification.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1 – 14 and 31 – 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Advanced Compiler Design & Implementation, Steven S. **Muchnick**, August 19, 1997 and USPN #6,519,765 B1 Kawahito et al, filed July 9, 1999 (referred to as Kaw).

Motivation to Combine

Muchnick teaches the common techniques of compiler theory and optimization and Kaw teaches data flow analysis. Therefore, it would have been obvious to one of ordinary skill at the time of invention to combine the teachings because optimized software is more efficient.

Claim 1

Munchnick teaches a method for analyzing a program, comprising: determining a set of functions required by the program by performing local type constraint analysis at intermediate language instruction level and a call path that may reach a function containing such instruction (Muchnick, page 609-618, CFG). Kaw teaches the optimization at runtime (Kaw, Abstract).

Therefore, it would have been obvious to one of ordinary skill at the time of invention to combine the teachings because optimized software is more efficient.

Claim 2

The method of Claim 1 further comprising: analyzing a program instruction that accesses an object field, wherein the analysis is performed locally to an object instantiation. (Kaw, “new” operation creates a new object

Claim 3

The method of Claim 1 further comprising: analyzing a program instruction that accesses an array element locally to an array instantiation. (Kaw, Abstract, Array access checked with range check).

Claim 4

The method of Claim 1 further comprising: analyzing a program instruction that accesses runtime information for a local runtime symbol usage. It is inherent for programs to access the symbol table during runtime.

Claim 5

The method of Claim 1 further comprising: analyzing a program instruction within an exception handler performed locally to an exception instruction. (Muchnick, pages 43-44, exception handler names are part of the symbol table).

Claim 6

The method of Claim 1 further comprising: declaring possible return types of native functions, where a type analysis of intermediate language instruction is not possible. (Muchnick, pages 612).

Claim 7

The method of Claim 6, wherein the set of functions may be in a single program image. Official Notice is taken that a single image is the minimum. And a small program will produce at least one image.

Claim 31

The method of Claim 1, wherein the program runs in a managed runtime environment. (Kaw, Abstract)

Claim 8

A computer-readable medium storing computer-executable process steps of a process for analyzing a program, comprising: determining a set of functions required by the program by performing local type constraint analysis at intermediate language instruction level and a call path that may reach a function containing such instruction.

See the rejection for claim 1.

Claim 9

The computer readable medium of Claim 8, further comprising: analyzing a program instruction that accesses an object field, wherein the analysis is performed locally to an object instantiation. See the rejection for claim 2.

Claim 10

The computer readable medium of Claim 8, further comprising: analyzing a program instruction that accesses an array element locally to an array instantiation.

See the rejection for claim 3.

Claim 11

The computer readable medium of Claim 8, further comprising: analyzing a program instruction that accesses runtime information for a local runtime symbol usage.

See the rejection for claim 4.

Claim 12

The computer readable medium of Claim 8, further comprising: analyzing a program instruction within an exception handler performed locally to an exception instruction.

See the rejection for claim 5.

Claim 13

The computer readable medium of Claim 8, further comprising: declaring possible return types of native functions, where a type analysis of intermediate language instruction is not possible.

See the rejection for claim 6.

Claim 14

The computer readable medium of Claim 13, wherein the set of functions may be in a single program image. See the rejection for claim 7.

Claim 32

The computer readable medium of Claim 8, wherein the program runs in a managed runtime environment. See the rejection for claim 31.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 15 – 30 and 33 – 36 are rejected under 35 U.S.C. 102(b) as being anticipated by

Fast Static Analysis of C++ Virtual Function Calls, David F. Bacon et al, ACM, 1996, pages 324 – 341.

Claim 15

Bacon anticipates a method for analyzing a program, comprising: determining an object type that may exist at an execution point of the program, wherein this enables determination of a possible virtual function that may be called. (Bacon, page 324 – Introduction and Overview and page 329 Tables results of analysis)

Claim 16

The method of Claim 15, further comprising: creating a call graph at a main entry point of the program; and recording an outgoing function call within a main function. (Bacon, and page 329 Tables results of analysis – Call Sites).

Claim 17

The method of Claim 16, further comprising: analyzing possible object types that may occur at any given instruction from any call path for a virtual call. (Bacon, page 338, section 4.2 – Alias).

Claim 18

The method of Claim 17, wherein possible object types are determined by tracking object types as they pass through plural constructs. (Bacon, page 325, upper left).

Claim 19

The method of Claim 15, further comprising: calling into function generically for handling specialized native runtime type information. (Bacon, page 333, bottom right of page)

Claim 33

The method of Claim 15, wherein the program runs in a managed runtime environment. Bacon, page 324, Introduction, Runtime.

Claim 20

A computer-readable medium storing computer-executable process steps of a process for analyzing a program, comprising: determining an object type that may exist at an execution point of the program, wherein this enables determination of possible virtual functions that may be called. See the rejection for claim 15.

Claim 21

The computer readable medium of Claim 20, further comprising: creating a call graph at a main entry point of the program; and recording an outgoing function call within a main function. See the rejection for claim 16.

Claim 22

The computer readable medium of Claim 21 further comprising: analyzing possible object types that may occur at any given instruction from a call path for virtual calls. See the rejection for claim 17.

Claim 23

The computer readable medium of Claim 22, wherein possible object types are determined by tracking object types as they pass through plural constructs. See the rejection for claim 18.

Claim 24

The computer readable medium of Claim 20, further comprising: calling into functions generically for handling specialized native runtime type information. See the rejection for claim 19.

Claim 34

The computer readable medium of Claim 20, wherein the program is in a managed runtime environment. See the rejection for claim 33.

Claim 25

A method for building an application, comprising: receiving source code instruction; determining optimum code requirement; and compiling native processor image. (Bacon, page 337, last part of section 3).

Claim 26

The method of Claim 25, wherein the optimum code is determined by performing a flow-sensitive analysis that determines possible types of objects that may exist at any instruction of a program. (Bacon, page 334, section 3.4).

Claim 27

The method of Claim 26, wherein based on a set of constraints, virtual functions that have the potential of being executed are determined. (Bacon, page 326, section 2.3).

Claim 35

The method of Claim 25, wherein the program runs in a managed runtime environment. (Bacon, page 324, Abstract and Introduction).

Claim 28

A computer-readable medium storing computer-executable process steps of a process for building an application, comprising: receiving source code instruction; determining optimum code requirement; and compiling native processor image.

See the rejection for claim 25.

Claim 29

The computer readable medium of Claim 28, wherein the optimum code is determined by performing a flow-sensitive analysis that determines possible types of objects that may exist at any instruction of a program. See the rejection for claim 26.

Claim 30

The computer readable medium of Claim 29, wherein based on a set of constraints, virtual functions that have the potential of being executed are determined.

Claim 36

The computer readable medium of Claim 28, wherein the program runs in a managed runtime environment. See the rejection for claim 35.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 37 – 42 are rejected under 35 U.S.C. 102(b) as being anticipated by Advanced Compiler Design & Implementation, Steven S. **Muchnick**, August 19, 1997.

Claim 37

Muchnick anticipates a method for determining variable size in a program, comprising: tracking variable size; and reducing variable size for program execution. (**Muchnick**, scope, pages 43-44).

Claim 38

The method of Claim 37, wherein if a variable is discrete, then it is hard coded to a single value. (**Muchnick**, page 230 – Constant Propagation).

Claim 39

The method of Claim 37, wherein if a first variable is assigned to a second variable, then a size constraint of the first variable is merged into a size constraint of the second variable. (**Muchnick**, pages 329 – 331, Constant Folding).

Claim 40

A computer-readable medium storing computer-executable process steps of a process for determining variable size in a program, comprising: tracking variable size; and reducing variable size for program execution. See the rejection for claim 37.

Claim 41

The computer readable medium of Claim 40, wherein if a variable is discrete, then it is hard coded to a single value. See the rejection for claim 38.

Claim 42

The computer readable medium of Claim 40, wherein if a first variable is assigned to a second variable, then a size constraint of the first variable is merged into a size constraint of the second variable. See the rejection for claim 39.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 43 and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by On Reducing Interprocess Communication Overhead in Concurrent Programs, Erik Stenman et al, ACM, 2002, 6 pages

Claim 43

Stenman anticipates a method for reducing empty function calls in a program, comprising: determining if a call is made to an empty function; and removing a call that is made to an empty function. (Stenman, eliminated empty functions (AKA stub code) by inserting a JUMP see the end of Section 5.1)

Claim 44

A computer-readable medium storing computer-executable process steps of a process for reducing empty function calls in a program, comprising: determining if a call is made to an empty function; and removing a call that is made to an empty function. See the rejection for claim 43.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claims 45 and 46 are rejected under 35 U.S.C. 102(b) as being anticipated by Exception Analysis for Non-Strict Languages, Kevin Glynn, ACM, 2002, pages 98-109.

Claim 45

A method for reducing throw instruction without exception handlers in a program, comprising: determining if there are any throw instructions without exception handlers; and removing throw instructions without exception handlers. Glynn, page 105, section 5 – Evaluation Results.

Claim 46

A computer-readable medium storing computer-executable process steps of a process for reducing throw instruction without exception handlers in a program, comprising: determining if there are any throw instructions without exception handlers; and removing throw instructions without exception handlers.

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

16. Claims 47 and 48 are rejected under 35 U.S.C. 102(b) as being anticipated by USPN# 6446258 B1 “Interactive instruction scheduling and block ordering”, Issued September 3, 2002, Christopher M. McKinsey.

Claim 47

A method for discarding comparison instructions in a program, comprising: determining if there are any comparison instructions with discrete values in the program; discarding a comparison instruction with a discrete value. (McKinsey, Abstract – replace loop invariant in compare of loop with constant).

Claim 48

A computer-readable medium storing computer-executable process steps of a process for discarding comparison instructions in a program, comprising: determining if there are any comparison instructions with discrete values in the program; and discarding a comparison instruction with a discrete value.

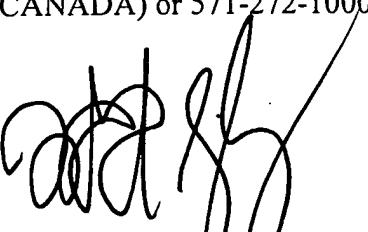
See the rejection for claim 47.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Todd Ingberg whose telephone number is (571) 272-3723. The examiner can normally be reached on during the work week..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Todd Ingberg
Primary Examiner
Art Unit 2193

TI